OUTLINE OF THE RESEARCH PROPOSAL SUBMITTED FOR THE TOPIC FOR DOCTOR OF PHILOSOPHY (MANAGEMENT) DEGREE IN COMMERCE AND MANAGEMENT

Title of Research Proposal:	"A STUDY OF SUSTAINABLE WASTE MANAGEMENT PRACTICES IN LUXURY HOTELS IN MAHARASHTRA"
Name of the Candidate:	Ms. Rachna Prashant Kulkarni
Basic Qualification of the Candidate:	Masters in Marketing Management, PG Diploma in Environment Pollution Control Technology, B.Sc in Microbiology
Name and Designation of Ph.D. Guide: **(Research Supervisor)**	Dr. (Smt). Naina Salve, Assistant Professor Alkesh Dinesh Mody Institute for Financial and Management Studies, Joravar Bhavan, University of Mumbai. Vidhyanagari, kalina. Santacruz (E). Mumbai- 400098.
Place of Work:	Prakriti Sanrachna, 32/265, Unnat Nagar 2, S.V.Road, Goregaon West, Mumbai - 400104
Date of Submission of Proposal:	
Signature of the Candidate:	
Signature of Research Guide: **(Research Supervisor)**	

INDEX

1. TITLE OF RESEARCH PROPOSAL 2
2. BRIEF INTRODUCTION OF RESEARCH THEME 2
2.1. Management and Nature 2
2.2. Origin of Pollution 2
2.3. Sustainability 3
2.4. Sustainable Hospitality 5
3. BUSINESS PRACTICES AND SUSTAINABILITY 6
3.1. Sustainable Environmental Factors for Planet 6
3.2. The rating process 7
3.3. Impact of Green Tourism on Profit 8
3.4. Correlation of Tourism in India with Hotel Industry and Waste 10
3.5. The problem identification 11
4. LITERATURE REVIEW 13
5. RESEARCH GAP AND AIM OF THE STUDY 23
5.1 Tabular listing of Literature review with Missing component of the Study 23
5.2 Gap Identification which can be covered in this research 29
5.3 Summary of Cost heads of Waste Management in Hotels 30
6. RESEARCH OBJECTIVES 32
7. CONCEPTUAL FRAMEWORK 33
8. HYPOTHESIS 34
9. RESEARCH METHODOLOGY 35
9.1. Universe of Study 35
9.2. Sampling Frame 35
9.2.1. Sampling Procedure 35
9.2.2. Units of observation and sample size 35
9.2.3. Data Collection 36
9.3. Data and Tools 37
10. SCOPE & SIGNIFICANCE OF STUDY 38
11. TIME FRAME OF THE RESEARCH 39
12. TENTATIVE SCHEME OF CHAPTERISATION: 39
13. REFERENCE 40

1. TITLE OF RESEARCH PROPOSAL :

A STUDY OF SUSTAINABLE WASTE MANAGEMENT PRACTICES IN LUXURY HOTELS IN MAHARASHTRA.

2. BRIEF INTRODUCTION OF RESEARCH THEME

2.1. Management and Nature

Traditional management was managing people, business, resources, finances and other business parameters efficiently. Before industrialization, resources were sufficient for everyone, therefore the traditional management focused on improving efficiencies and generating better profit for the company. With the advent of industrialization, faster production leading to better profit created an imbalance in the demand and supply of natural resources. Our consumption was more than rate of production of nature, resulting in increase in demand for fossil fuel, minerals and precious metals. Slowly, the resource crunch started becoming evident. The traditional management moved to a more holistic management due to the changing scenarios of globalization. The process of evolution where all five elements of nature remain in balance is always sustainable. The imbalance happened with the advent of industrial revolution in the west. The eastern part of the world had environment friendly know-how for metal refining, traded with other countries, had good engineering and architectural practices. There was awareness about preserving natural resources and balancing them in sync with the nature.

2.2. Origin of Pollution

Industrial revolution led to increase in waste all five elements. This led to the coining of the term pollutant which caused air pollution, water pollution, ozone layer depletion, soil pollution, and energy. This forms the basis for the classification of primary, secondary and tertiary pollutant as scope 1, scope 2 and scope 3 emissions which forms the basis of computing GHG emissions in sustainability reporting by any organization. Air pollution led to increase in breathing trouble, crops getting affected due to poor air quality and general poor health of people living in areas which are high in air pollution due to lack of oxygen. Water pollution led to poor drinking water, contamination of ground water resources, heavy metals flowing into the drinking water, different diseases like the Minimata disease which

was passed on to the humans from the fish due to Mercury pollution. Solid Waste pollutes the soil, the air and the water together. Ozone layer depletion is attributed to the gases coming out of the polluted air from the factories in all the parts of the world. To manage any of the pollutions described above, excessive energy is utilized or wasted which could be from a fossil fuel or solar powered. With the advent of plastic and urbanization, the waste started getting accumulated in dumping grounds as compared to earlier, where waste was treated at individual homes. Segregation of waste was needed to be implemented as the simplest solution for efficient treatment of municipal solid waste. The industry started developing solutions for converting waste to energy, while the youth of India started upcycling and recycling of single use plastics into beautiful bags, pouches, files, recycling of jeans into bags, flower pots and other useful products, old T-shirts into bags, old bedsheets into doormats, making boards out of dry waste which can make furniture, composting solutions, planters out of plastic bottles for windows, artefacts out of automobile waste, upcycling clothes to make sustainable fashion, disposed plastic into fashion, making sports shoes out of plastic bags, converted PET Bottles daily to recycled polyester staple fibre, and many others ventures who are trying their level best to reduce waste and recycle as much as possible in India. The piles of waste that we have accumulated over a period of last 60 years will get treated and slowly eliminated through concerted efforts when all of us will work towards reducing waste in our day to day life.

2.3. Sustainability

Sustainability is the ability to maintain or support a process continuously over time. In business and policy contexts, sustainability seeks to prevent the depletion of natural or physical resources, so that they will remain available for the long term. It is the ability to maintain or support a process over time and is often broken into three core concepts of economic, environmental, and social. Many businesses and governments have committed to sustainable goals, such as reducing their environmental footprints and conserving resources. Some investors are actively embracing sustainability investments, known as green investments. Many people have accused some companies of greenwashing, a practice of misleading the public to make a business seem more environmentally friendly than it actually is. In 1983, the United Nations tapped former Norwegian

Prime Minister, Gro Harlem Brundtland to run the new World Commission on Environment and Development. After decades of effort to raise living standards through industrialization, many countries were still dealing with extreme poverty. It seemed that economic development at the cost of ecological health and social equity did not lead to long lasting prosperity. It was clear that the world needed to find a way to harmonize ecology with prosperity. After four years, Brundtland defined sustainable development as development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

Sustainability is a societal goal with three dimensions namely Environmental Sustainability, Economic Sustainability and Social Sustainability. Environmental Sustainability is where Ecological integrity is maintained, all of earth's environmental systems are kept in balance while natural resources within them are consumed by humans at a rate where they are able to replenish themselves, Environmental Sustainability is achieved through resource management, environmental protection, habitat restoration and preservation. In Economic Sustainability, Human communities across the globe are able to maintain their independence and have access to the resources that they require, financial and others, required to meet their needs. Economic Sustainability involves smart growth, long range planning and cost savings. People consist of social variables dealing with community, education, equity, social resources, health, well being and quality of life. Planet consists of environmental variables relating to natural resources, air quality, energy conservation and land use. Profit consists of economic variables dealing with the bottom line and cash flow. When people take care of only planet, an action becomes bearable. When people take care of only profit then the action is equitable. When the planet takes care of only the profit and vice versa the action is viable. But when People, Planet and Profit taking are taken care of together the action becomes sustainable.

Social Sustainability is about stability on a Society or a community. If a resource is used by one community, it should be used in a manner such that not only the present ecosystem, even the future generations are not harmed by the use of the resource by the aforementioned community. Universal human rights and basic necessities should available to all people, who have access to enough resources in order to keep their families and communities healthy and secure. Healthy communities have just leaders who ensure personal, labour and cultural rights are respected and all people are

protected from discrimination. Social Sustainability, thus entails quality of life, education, community development, equal opportunity, laws and ethics and preservation of natural resources. Each pillar of sustainability is dependent on the other pillar for a successful and Sustainable society.

In order to achieve the sustainability goals, the United Nations is striving hard by introducing the UN Sustainability goals. The United Nations Sustainable Development Goals are as to End Poverty in all its forms Everywhere, End hunger, achieve food security and improved nutrition and promote sustainable agriculture, Ensure healthy lives and promote well-being for all at all ages, Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all, Achieve gender equality and empower all women and girls, Ensure availability and sustainable management of water and sanitation for all, Ensure access to affordable, reliable, sustainable and modern energy for all, Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all, Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation, Reduce inequality within and among countries, Make cities and human settlements inclusive, safe, resilient and sustainable, Ensure sustainable consumption and production patterns, Take urgent action to combat climate change and its impacts, Conserve and sustainably use the oceans, seas and marine resources for sustainable development, Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, halt and reverse land degradation, and half diversity loss, Provide peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels and to Strengthen the menas of implementation and revitalize the global partnership for sustainable development.

2.4. Sustainable Hospitality

Sustainability is on top of the agenda today in the World. Investors and financial decision makers are demanding an implemented ESG report and a path to Net Zero Carbon emissions to keep the

differential temperature of the Earth, from rising above 1.5°C[1]. Some financial companies in Europe have stopped investing in companies that are not do not a. Expectations are rising at all levels – Industry, Government, Global financial markets and Global policy makers are setting Sustainability goals for their organisations. As global regulations towards the effort to fight the Climate change expand, many organizations don't have a solution to the current climate-effort math equation.

Sustainability practices and Corporate Social Responsibility of hotels are the subject of growing demand from all stakeholders - guests, hotel personnel, the local community, investors, and society at large. Sustainable hospitality respects cultural values, engages in fair-market competitiveness, supports local businesses and community, and provides good labour condition. A growing number of companies are treating sustainability as an important objective in their strategy and operations to increase growth and global competitiveness. There are many reasons for the companies to pursue sustainability like increase in operational efficiency by reducing costs and waste, reaching new customers and increasing the competitive advantage, protecting and strengthening the brand, reputation and building public trust, building long-term business viability, success and responding to regulatory constraints and opportunities. A hotel with Sustainability on its agenda meets most of the above objectives. As a part of Sustainable Economic Factors, Organizations that run Hotels and operators, implement sustainable practices while increasing profitability. Hotels that are designed as per sustainability principles not only provide a favourable environment for guests and staff, but, run at optimal efficiency, and reduce operational cost, for the benefit of all stakeholders.

3. BUSINESS PRACTICES AND SUSTAINABILITY

3.1. Sustainable Environmental Factors for Planet

Sustainable hotels respect the socio-economic needs of hotel staff and the local community and are operated for the profit of the owners and operators while lowering their environmental impact. Sustainable practices call for respect of the environment in hotel design, development and

[1] Intergovernmental Panel of Climate Change report

operation. The environmental impact of hotels on the local and global environment is drastic. In Europe, the built environment is responsible for 40% of energy consumption and 36% of green-house (CO_2) emissions. Of all real estate asset classes, hotels are the most energy- and water-intensive. (Autin, 2020). Hotel companies and individual hotel owners adopt sustainable solutions for the day-to-day operations of their hotels. Their sustainable practices include cutting water usage, lowering waste, saving energy, and/or using renewable energy sources. Hotel policies are generally aimed to either minimize the impact on the environment or contribute to nature preservation and regeneration. Sustainability decisions are made to combat climate change that lead to a significant cost saving over the longer term. Executives and investment professionals largely agree that environmental, social, and governance programs create short- and long-term value for shareholders —though perceptions of how, have changed over the past decade. Sustainable practices in hotel operations are employed to maintain the qualities that are valued in the physical environment within the means of natural systems ie. environment and without harming other people ie. society and culture.

Hotel design and development are being focused on environmental protection and sustainable hotel operations, to reduce the associated climate risk, provide a satisfying guest experience, improve the work environment for staff, and increase profitability. Their heightened exposure to climate change and increased pressure from all stakeholders have made green building initiatives of special importance to the hospitality industry. Sustainability reporting the disclosure of the environmental and other effects of organizations economic actions contributes towards assessing the industry's global impacts.

3.2. The rating process

In India, hotels are rated by The Hotel and Restaurant Approval and Classification Committee (HRACC), which falls under the umbrella of the Ministry of Tourism. The committee is further divided into two wings, one that assesses one to three star hotels and another that assess three to five star hotels. The committee is made up of eight members from various sub-sectors in the hospitality industry including one nominee each from the department of tourism in the Central government, the state tourism department, tour operators, travel agents, a hotel management institute, a nominee from the hotel industry who is considered a specialist in the hospitality industry and an The federation of hotel and restaurant association of India (FHRAI) member. The

committee contacts a hotel that has applied for classification and books a time to visit. The assessment takes around three hours where the committee usually has a meal in one of the restaurants and inspects the hotel grounds. The Assessors assess the hotel based on specified broad categories, which have a further sub-categories. On a very general level, some points that are considered in establishing a standard are food services, entertainment, view, room variations such as size and additional amenities, spas and fitness facilities, hygiene, ease of access and location. The Inspectors would check in to a hotel in past to assess the service of the Hotel, but now, the process only takes about three hours. They do not have a prescribed procedure for the star rating the hotel, otherwise, every hotel would be able to get a five star rating. Now, the inspectors only have a quick bite at a restaurant or the coffee shop, observe the services offered, check hygiene levels and a few other observations and leave within three hours. They do consider the feedback left by guests on the social media.

A Hotel does not generally lose the rating once received but if malicious activities like gambling, prostitution and drugs are found in the hotel, the hotel can face severe consequences, including losing the ratings by the Department of Tourism. The Validity of the ratings is for five years and applications for reclassification are required to be handed in three months before the expiry of the approval rating. Whether it is Europe, the US or other Asian markets, hospitality can mean different things and have different standards according to various cultures.

3.3. Impact of Green Tourism on Profit

Hotel operators identify hotels that have embraced eco-friendly practices and create a data base of resources of eco-friendly and sustainable hotels and benchmark their practices for consideration and fit in their own operations. It has been noted that codes of conduct have been produced for tourists/guests to educate them about societies they visit. A code of conduct for eco-friendly and sustainable lodging could be developed to communicate to guests and potential guests the properties commitment to the environment, the community, and their lodge as an employer. A code of eco-friendly and sustainability could be used as a tool to educate guests to behave in a more responsible way. If a code were developed it would be logical to have lodging guests provide input and feedback. Green Business Certification Inc (GBCI) is an American certifying agency which substantiates claims made about businesses that opt for any of the GBCI programs, have

better revenue earnings and meet the triple bottom line better than the peers who do not comply with Green Building standards.

Guests prefer to return to Sustainable hotels, since Sustainable Hotels have a better impact on the satisfaction and intention to return from different nationalities. India has been sustainable culturally, as a society. The effort is to optimize the hotel's operation in a sustainable way to benefit community, environment, and its own sustainability as a business. The geography will differ location to location and the focus should be on sustainable development with consideration of all sustainable factors. Hotels should be good employers and benefit the local workforce and by doing so, advance their own human resource sustainability and operational staffing needs. Tied to this effort is the need to be, eco-friendly and sustainable research and recommendations, promotion of a hotel's sustainable efforts and strong encouragement of employees and guest's participation. For employees, this effort will require continuous training. A recognition can be attached via hotel certifications or the awarding of badges for achievement, or creating a professional designation like *"sustainability champion"* for employees. Badges in this framework represent a way of acknowledging achievements or skill acquisition at a more granular level. Credentials, badges continue to gain traction as a method to acknowledge achievement and establish qualifications in various professional fields. Eco-friendly and sustainable goals framed by a code of conduct may be an optimal method for hotels to pursue.

For guests, this type of recognition program needs to be promoted for optimal engagement. Lodging operators cannot force the adoption of a sustainable code of conduct for a guest, however, they could entice potential guests and returning guests to engage in hotel’s sustainable practices by tying guest eco-friendly and sustainable hotel actions to the hotel code of conduct and loyalty programs. Given travelers affinity for sustainable efforts in today's traveling world, a program that provides education, recognition and guest rewards could also provide guest loyalty, and result in optimal hotel eco-friendly and sustainable efforts. The guest could earn an eco-friendly and sustainability badge that is connected to their loyalty program and provides additional benefits for them during their stays.

3.4. Correlation of Tourism in India with Hotel Industry and Waste

According to World Travel and Tourism Council, India is ranked tenth among 185 countries in terms of travel and tourism's total contribution to GDP in 2019[2]. In 2020, the Indian tourism sector accounted for 39 million jobs, which was 8% of the total employment in the country for that year. The travel market in India is projected to reach US$ 125 billion by FY27 from an estimated US$ 75 billion in FY20. The Indian airline travel market was estimated at ~US$ 20 billion and is projected to double in size by FY27 due to improving airport infrastructure and growing access to passports. The Indian hotel market including domestic, inbound and outbound was estimated at ~US$ 32 billion in FY20 and is expected to reach ~US$ 52 billion by FY27, driven by the surging demand from travellers and sustained efforts of travel agents to boost the market. By 2028, international tourist arrivals are expected to reach 30.5 billion and generate revenue over US$ 59 billion. However, domestic tourists are expected to drive the growth, post pandemic. International hotel chains are increasing their presence in the country, and it will account for around 47% share in the tourism and hospitality sector of India by 2020 and 50% by 2022. Foreign Tourist Arrivals[3] (FTAs) in August 2022 were 498,243 with a positive growth rate of 437.3% as compared to 92,728 in August 2021. FTAs during the period January-August, 2022 were 3,263,219 as compared to 638,524 in January-August 2021.

The growth of Waste Management sector is proportionate to the growth of the tourism Industry, Hotels included. As tourism increases, the need for Swachh Bharat will increase and consequently, methods of Waste management will also need to improve. We cannot afford to make Landfill sites, a place to visit for foreign nationals to see consequences of inordinate delay of seriousness of waste management by India. By 2025, the waste management market size in India is projected to be worth ~USD 15 Billion, with annual growth around 7 percent.[14]A growing economy, soaring urban population, rising living standards and increasing consumption levels are common trends in emerging economies across the globe. Similarly, in India, an increase in the purchasing power parity has led to more affordability, accessibility to resource use and a rapid surge in the waste volumes as well. Considering the current trend toward urbanization in India, the MSW quantum is

[2] www.tourism.gov.in, report on India Tourism Statistics at a glance 2021

[3] https://tourism.gov.in/sites/default/files/2022-09/India%20Tourism%20Statistics%20at%20a%20Glance%202021%20%281%29.pdf

expected to double the existing volumes within ten years. At approximately 80-85 MTs by 2030, presenting a business opportunity estimated at US$20 Billion. The occupancy of the hotels is looking up words considering India's presidency for G20 summit. The hotel industry is getting the oxygen, it needs most to fly post-pandemic this year. While we brace ourselves to perform better, we have a commitment towards the environment. Increase in tourism directly impacts the growth of hospitality sector.

ITC Hotels in 2021, was recognized by the USGBC (United States Green Building Council) to be the first Green Hotel. US Green Building Council (USGBC) has recognized ITC Windsor, Bengaluru as the first hotel in the world to achieve the Leadership in Energy and Environmental Deasign (LEED) Zero Carbon Certification. Since the cost of Certification is high, many businesses do not opt for certification but track their own progress on ARC Skoru[4]. ARC Scale is an independent score which allows anyone to enter the data and see one's own performance according to the LEED standards.

3.5. The problem identification

For the purpose of this Study, we are taking Hotel Industry as an example for Study of Sustainable Management practices, since the Hotel industry was the worst hit industry in terms of business during COVID-19. Hotels were shut for a long time and it became extremely difficult for hotels to sustain their businesses. The importance of Sustainability couldn't be taught better by Mother Nature, during adversity. Hotels which survived this adversity either had deep pockets or knew how to run their businesses sustainably. Municipal waste generated by hospitality has become a significant sustainability challenge for tourist destinations. Ambitious sectoral actions to mitigate waste generation will require changes in the hospitality businesses' internal operations combined with costly municipal waste services transformation. The impact of hospitality services and mitigation strategies on mixed-waste generation were estimated. Results revealed that impacts differ according to the meal plans offered and that mixed-waste generation is higher in apartments than in hotels due to the accommodation and structural services nature. Notably, employee training is found to have a greater prevention effect than alternative waste management strategies. Profound changes in municipal waste management design and guidelines to facilitate engagement of the

[4] https://arcskoru.com/transform-every-space-building-and-place

society, hotel staff and tourists are imperative. There are underlining opportunities for cooperation between policymakers and hospitality managers. Luxury hotels generate substantial carbon footprint and scholarly research is urgently required to better understand how it could be effectively mitigated.

My study focusses on only two out of the seventeen SDG goals of United Nations, namely, Life on Land and Clean Water and Sanitation. Good Waste Management practices allow for improvement of Life on Land by not contaminating the Landfills. The treatment and recycling of water from the hotel will help in assessing the Clean water and Sanitation goals. Many researches are carried out in different Waste streams, but do not compare technologies used in treatment of waste. A treatment method may be novel, but employing it may not be the best solution for the hotel. We plan to evaluate the treatment methods on basis of Cost, Energy and Sustainability. A few of the problems being identified are Energy is being used for managing Waste in most of the hotels when it can be treated more optimally, Cost is being incurred to manage waste, rather energy being used. Hotels do not manage their solid waste on their own, it is outsourced, similarly, laundry, which is a high pollutant for water, is outsourced since the hotel does not want to invest in an effluent treatment plant. The intention of the Hotel industry is not to load the landfill, but waste is being contributed to the landfill. Thus, a need for study of Sustainable Waste Management practices in Luxury Hotels arises.

The next chapter, *literature review*, discusses the work done in the field of Sustainability with special reference to Solid Waste Management and Waste Water management.

4. LITERATURE REVIEW

Exploratory research was done by Amicarelli[5] et. al.(2022) which focused on managing and minimizing food wastage in the hotel industry. The research highlighted that food waste is generally of good quality and this wastage can be reduced. The options suggested were to confirm the guest attendance, improve communication between departments and perishable goods' storage and management. The research paper explores only on reducing food waste while the other types of waste are not discussed throughout the paper. Hotel industry waste characterization is not discussed. Similarly, there is no mention on the treatment options being carried out by the hotel industry.

A review was conducted by RC Pandey[6](2021) et. al. on waste management on hotels in Dehradun. They studied the present waste management by reviewing literature on trash audit, WARM model, analysis on cost-benefit approaches and equivalency calculators. The characterization of waste from the hotels is carried out along with recycling options for each type of waste generated providing a generic view of processing and recycling. The comparison of various technologies is not carried out in this paper.

The study carried out by Dr. Edoun et. al.[7](2019) on impact of waste management in the hospitality industry found that the highest amount of wastage was found in food waste and within food wastage, buffet serving system was identified as the main reason for wastage. Within the research paper, there is no emphasis on the technologies adopted or available on processing of waste. The survey also does not take into account the quantum of waste generated by the hotels surveyed.

[5] Bux, C., and Amicarelli, V. (2022). Circular economy and sustainable strategies in the hospitality industry: Current trends and empirical implications. Tourism and Hospitality Research, 0(0). https://doi.org/10.1177/14673584221119581

[6] https://www.bibliomed.org/?mno=127723

[7] http://www.ieomsociety.org/ieom2019/papers/596.pdf

Suja Giri[8](2021) studied an integrated solid waste management case study of a hotel reveals that there are no proper waste management segregation techniques used by any hotel in Kathmandu. The waste in the kitchen area is not properly segregated and the bin placement and waste storage portion are not properly handled by staffs during the rush period. This paper does not highlight the technology options available and considers landfilling as the only option. The quantum of waste and characterization of waste is also not evaluated in the case study.

According to the study by Popley and Melgarejo(2020)[9] on water management strategies in hotels in arid regions from a case study on Gran Canaria Island, four themes were studied, viz. hotel water use, quality, water scarcity, promoting water efficiency and conservation practices, sustaining supply through corporate water stewardship. The study found that 4-star hotels were more water efficient as compared to 5-star hotels. The three hotels surveyed in the study used secondary treatment systems to remove minerals and improve the taste of water for use in food and beverages. The study highlights treatment options for water but does not give an overview of the treatment technologies for waste water. The waste water is not studied in the report.

Kasim et. al.(2014)[10] unravels the importance of water management practices in hotel companies and proposes a practical water management framework for hotels. The study highlights that water usage per capita is higher in hotels, thus, gray water can be reused for flushing, and other non-consumable activities. Wetlands can be installed within the premises of the hotels and the constructed wetland was a pleasant looking and natural habitat for some species. The study is conducted for both small scale hotels and medium scale hotels. The comparison of technologies is not carried out in this paper. Similarly, technologies are not discussed in detail within the scope of the research paper. The cost factor for treatment of water and effluent from the hotel industry is not attempted.

---

8 https://www.researchgate.net/publication/354144693_INTEGRATED_SOLID_WASTE_MANAGEMENT_A_CASE_STUDY_OF_A_HOTEL_IN_KATHMANDU_NEPAL

9 ISSN: 0798-1015 DOI: 10.48082/espacios-a20v41n43p18

10 https://www.researchgate.net/publication/271569232_The_importance_of_water_management_in_hotels_A_framework_for_sustainability_through_innovation

Pirani[11](2014) et. al. reviewed the literature currently available on solid waste management in the hospitality sector. The waste mapping process is described in detail in this study along with the waste hierarchy which is considered as part of the first step of any environmentally sustainable waste management policy. The study highlights Swedish best practice that has shown efficient waste management techniques to reduce the quantity of unsorted waste per guest-night which may be restricted only to the region of the study, since waste characteristics could differ substantially in other parts of the world. This study could be used to further used to device measures to reduce the generation of waste at source. The study is a compilation of various constituent generation of waste from the hotel industry. The suggestions from the study are too idealistic and cannot be generalized for all scenarios of waste reduction. The study does not discuss the available processing technologies in detail. Also, the demographic case studies are generalizations for the entire region. More samples of surveys can be carried out to find out the deviation.

The review of literatures carried out for sustainability in waste management by Kumar(2020) et. al., highlights that the waste generated in the hotel industry can be recycled through composting, anaerobic digestion and worm-composting. The waste characterization highlights the composition of types of waste, such as kitchen waste comprises of wood, textile, metal, nylon, carboard, napkins etc. However, the literature survey does not cover the demographics in which the research has been carried out which is very vital to the hotel industry and specific to waste generation.

Singh(2018)[12] carried out a study on the Indian hotel industry on food waste management. In the study, surveys were carried out from respondents of different demographics. The short study concluded that food waste from hotel industry is such a big challenge, thus there is a requirement to develop a holistic framework for waste management. In hotel industry, most of the food wastes are compostable. The study is short and does not include the technological options for food waste treatment. Similarly, there is no study over cost required to carry out the mechanisms to treat waste.

[11] https://pubmed.ncbi.nlm.nih.gov/25194519/

[12] https://www.researchgate.net/publication/323356841_Food_Waste_Management_Study_of_Indian_Hotel_Industry

Rekha[13](2019) et. al. studied food waste management in hotels with special reference to Coimbatore city. According to the study, analysis of food waste was carried out amongst hotels. The study found that social media plays a major role in creating awareness about food waste management among the hoteliers. The study also concluded that the government must take high standard steps to manage the food wastes among the hotels. The study is based on secondary data sourced from literature review and primary data received from filling of surveys from 150 respondents. The study does not give a holistic approach and affirmation on the quantum of wet waste produced within the hotel industry. The study is short and does not include the technological options for food waste treatment.

Le Hoang Son(2018)[14] et. al. studied estimation of the solid waste generation and recycling potential of the hotel sector in South East Asia. The study was conducted for hotels in Hue city for 1-star, 2-star, 3-star, 4-star and 5-star hotels. The waste characterization and other analysis were carried out and found that, the generation of waste in 5-star hotels was greater than 1-star hotels. Food waste constituted the largest amount of general waste, and segregation of waste was not a common feature. The methods incorporated by the hotels' staff was not studied for the study. The technologies for treatment of waste and the cost budget were not discussed in the above-mentioned case study.

Kamna Vaidya[15] et. al.(2018), carried out a review on solid waste management industry for hotels in South east Asia over a period of five years. According to the study, waste elimination at source and recycling can save greenhouse gases' emission to a large extent. The study highlights methods to carry out waste audit, equivalency calculator, cost benefit analysis and treatment of recyclable waste. However, the study is not carried out for the above-mentioned surveyed hotels and a detailed analysis of same is missing from the research paper. Similarly, details of the technology options shared have not been provided.

[13] https://scholar.google.com/scholar?oi=bibsandcluster=13010703655210196318andbtnI=1andhl=en

[14] Journal of Environmental Protection, 2018, 9, 751-769 http://www.scirp.org/journal/jep

[15] IJSRD - International Journal for Scientific Research and Development| Vol. 5, Issue 09, 2017 | ISSN (online): 2321-0613

Mr. Dalvi(2022)[16] et. al. reviewed Solid Waste Management Emphasis on Hotel Waste. The sources of hotel waste have been studied in detail along with ways to minimize the high quantum of wastage that occurs. Hotel waste minimization techniques of reuse, recycle, dispose and recover have been discussed in the paper. Since the paper is a literature review, there are no detailed case studies explained or surveys conducted. A real time verification of data could have been carried out to cull out the strategies with data-backing.

Antanova[17](2022) et. al. studied the water resource management in the hotels using a sustainable score board. The study linked the scorecard to the sustainable development goals. The study has highlighted that the usage of water per capita is very high during holidays as compared to daily domestic usage of water. For the hotel's surveys, it was observed that the consumption of water in 5-star hotels was greater and the environmental awareness was 30% higher for the customers surveyed in 5-star hotels. The hotels, although, onboard with the idea of saving water would lead to significant cost savings. However, very few hotels shared the details on the financial implications of these measures on their daily operations and financial benefit. Goal 6 is the key focal point for the study, however other SDGs are also closely linked to hotels and functioning. The methods and strategies are not discussed in the paper to achieve sustainability or work towards achieving SDGs.

A study on 'Solid Waste Management in Tourism Sector of Ghana' by E. Appaw-Agbola and Freeman(2015)[18], of selected hotels in the region Ho, the regional capital of Volta Region revealed that food leftovers, vegetables, bones, bottles, cans and plastic bottles that cannot be burnt were deposited at landfill site.

The literature review on solid waste audit authored by Omidani[19], Hezaveh(2016), from India, has provided with explanation on WARM Model, Equivalency calculator and cost benefit analysis

---

16 https://ijaem.net/issue_dcp/Solid%20Waste%20Management%20Emphasis%20on%20Hotel%20Waste%20a%20Review.pdf

17 Antonova, N.; Ruiz-Rosa, I.; Mendoza-Jimenez, J. Water Resource Management in Hotels Using a Sustainable Balanced Scorecard. *Sustainability* **2022**, *14*, 8171. https://doi.org/10.3390/su14138171

18 https://www.semanticscholar.org/paper/Solid-Waste-Management-in-the-Tourism-Sector-of-A-Appaw-Agbola-Freeman/f74098fe9b63420a8ad3f4c9b2d8abdc406c0b0e

19 https://www.ijsrp.org/research-paper-0916/ijsrp-p5792.pdf

techniques on hotel properties and examining status of Waste Management According to the waste management practices of small hotels in Accra studied by Mensah et. al.(2020),, University of Cape Coast gives details on the application of the waste management hierarchy model. The study finds that hotels did not strictly adhere to the waste management hotel model and the hotels should employ sufficiency approach by influencing the attitudes of employees and guests toward waste prevention and reduction. However, the study is limited to small-scale hotels.

Vikas Mohan et. al.(2017)[20] conducted a study on Reduction and Management of Waste in Hotel Industries. The article compiles available information from literature on reduction and management of waste in hotel industries. Both the research paper does not provide technology solutions or cost benefit analysis of the technologies.

According to research on analyzing solid waste management practices for hotel industry done by S.T. Pham Phu[21] et. al., the tourism industry in HAC, Vietnam has a customer solid waste generation rate at 2.28 kg/guest/day. 84.3% of hotel waste was organic waste. Results suggested the waste recycling and composting potential of hotel's solid waste management is an opportunity for recycling that can be tapped into. However, the research takes very small group of survey and secondary survey data.

Janeen Tang(2004)[22] has worked on a case study on 'Hotel Solid Waste Management Program in Bali, Indonesia.' It highlights that the tourism has direct impact on local communities through solid waste management. This paper is regarding a hotel Solid Waste Management Program and investigation of operational and management issues.

A review on hotel industry by Yashwant Singh Rawal and Takuli(2021)[23] showed the importance of alternative requirements for disposal of waste without affecting the environment and health of the people in surrounding area. The study underlines the possibility of waste to energy technology,

---

[20] Mohan, Vikas and Deepak, Bansal and Sharma, Dr. (2017). Reduction and Management of Waste in Hotel Industries. International Journal of Engineering Research and Applications. 07. 34-37. 10.9790/9622-0707103437.

[21] Global Journal of Environmental Science and Management 4 (1), 19-30

[22] https://uwspace.uwaterloo.ca/handle/10012/983

[23] https://www.researchgate.net/profile/Yashwant-Rawal-/publication/354552428_WASTE_MANAGEMENT_A_REVIEW_ON_HOTEL_INDUSTRY/links/613f6fe684e39807c761c2a9/WASTE-MANAGEMENT-A-REVIEW-ON-HOTEL-INDUSTRY.pdf

however, the cost factors, efficiency of technology, has not been taken into consideration within the study.

A study was carried out on Waste Management Practices in Indian Hotels by Shrivastava et. al.[24] identified the chief waste sources and practices followed, through Literature review. A technology review was not carried out. Study of a cost benefit analysis on adopting environment friendly methods could help the study outcome.

Along with Solid waste management in the hotel industry, literature review was also carried our for wastewater treatment and recycling, since it is a part of the waste in the hotel industry. As per the research conducted by Murat Hocaoglu et. al.., 2010; Paulo et. al.., 2013, the research highlights a qualitative and quantitative leap forward in water management corresponding to the recovery of water after treatment. Depending on the use of reclaimed water, special attention must be paid to water quality to avoid risks to the environment and human health and to comply with current legislation on the reuse of reclaimed water. Stream segregation in greywater and blackwater can provide differentiated treatment options to enhance process efficiency. In addition, Beler-Baykal, 2019 studied the greywater contamination by fecal pathogens is avoided and blackwater streams are highly concentrated in organic load allowing for nutrient and energy recovery.

Chen et. al.., 2013 mentions the factors such as the scale and degree of complexity of treatment facilities, the climate of the area, the water management and water saving strategies and the nature of services provided govern the highly variable water demand per tourist.

Chandran and Bhattacharya(2015)[25] studied the Customers changing attitude toward green products and services, which is the strongest interpreter of implementation of Green hotel practices. Consumers are interested in enjoying the beauty of natural resources, so the green marketing is becoming more important for the hotels to attract green consumers. Hotel industry can increase the level of sustainability from the proper building site and design, refurbishing,

---

[24] https://www.researchgate.net/publication/363254202_Challenges_of_waste_management_in_Delhi_India_and_its_scope_of_improvement_to_achieve_cities_sustainability_in_developing_nations_A_review

[25] https://www.scirp.org/(S(351jmbntvnsjt1aadkposzje))/journal/paperinformation.aspx?paperid=60503

developing multi-tier green space through selected trees, shrubs and climbers to provide ambience and controlling climate vulnerability like controlling Urban Heat Island Effect (UHIE) and reusing existing buildings, and sustainable construction. This study examines the understanding the importance of green marketing with respect to implementing green practices in the hotel industry.

As global tourist arrival numbers continue to increase, the demand and supply trends in regard to sustainable business practices are shifting with regard to the hotels. Individual travelers, organizations and banking consortiums, are changing perceptions about the requirements for the future and the responsibilities that the hotel is carry regarding the future. Hotel owners and operators have adapted to these changes in order to satisfy demand and remain attractive to investors as well as operationally feasible and profitable a paper on sustainable Hotel business practices by Elena E Bader examines the benefits, especially economic of sustainable business practices and sustainability trends in demand and supply.

Borboudaki et. al.., 2005 explained the wastewater generated in touristic resorts must be treated before being discharged into the environment in their study. However, the effluent quality may exceed the legislative limits when the influent flow exceeds the design capacity of the wastewater treatment facility. This situation is very typical in tourist areas where there is seasonal population growth.

Elkington, (2001) and Porter and Van de Linde, (1995) did a detailed case study is provided of a gray and black water recycling system in a Malaysian resort. This study contributes to the literature by showing that hotel business of all sizes, including the small and medium businesses, can engage in, and benefit from the triple bottom line and “win-win” business approaches despite the internal and external challenges.

Kasliwal, Agarwal,(2019) did a study on development of delightful customers with the fast degradation of the environment and changing lifestyle of the consumers, the companies have started moving towards the concept of green marketing, products and services by upgrading customer satisfaction always help to achieved competitive edge in the market. Green Marketing in hotel industry means using environmentally friendly products and services in hotels and accommodations. Green marketing is a key factor in the hospitality industries because major

portion of the harmful chemicals are found in the hotel industry which harms the environment most and it play a prominent role to market those services which do not harm the environment.

The study by Calisto et. al., (2021), examines the differences between smaller hotel chains and their larger global counterparts regarding environmentally sustainable practices. Environmental issues are, for most companies, not a response to societal challenges 'doing the right thing' but rather a response to owners concerns 'doing things right'. Hotel managers are mainly guided, in their choice of sustainable practices, by their immediate impact on the business, in their permanent quest for efficiency, and do not yet see the advantage of investing in sustainability as a differentiation feature. Hotel chains develop environmental sustainability practices, mainly for cost-reduction purposes, accommodating the owners' demands for efficiency.

Green initiatives are beneficial as long as managers include these initiatives in their overall strategic marketing programs that also promote firm value propositions, brand images and reputation was studied by Rosenbaum, Anthony Wong, (2015). Hotel's green initiatives are a significant predictor of customers overall assessment of a hotels marketing programs, which we treat as a latent variable construct that directly affects guest loyalty. Comparing green equity with other indicators of a guests' assessment of a hotel's marketing program, including value, branding and relationship equities, it is the weakest indicator. Tourists are willing to pay a price premium for a hotel's green marketing program. This study links green marketing to the customer equity model and clarifies the impact of green marketing programs on loyalty and profitability.

Punitha, Rasdi[26], (2013) studied the green based practices will be an added advantage for hotels to achieve superior financial and market performance in ensuring a balance between development and environmental sustainability through literature and theories surrounding CSR, Malaysian government's role in protecting the environment, the challenges of green marketing and the state of CSR within the hotel industry. Hotels are found to be under constant pressure to balance the diverse forms of corporate social responsibility, Whilst hoteliers are striving to achieve financial

[26] https://citeseerx.ist.psu.edu/document?repid=rep1andtype=pdfanddoi=306bd3cdb1c2088c096af50bc290361eafd94adf

performance by practicing green marketing, gaining the trust and meeting the expectations of the public have become more challenging.

Floricic, (2020)[27], examined the importance of sustainable hotel engineering and organisation of facilities for the purposes of realisation of a sustainable and responsible hospitality facility business. Sustainable hospitality facilities emerged because implementation of the sustainable development concept in tourism not only for the purposes of achievement of an ecologically more effective, more responsible, but also as a more efficient and more profitable business practice. Hotel facilities which are constructed, and which operate in line with the sustainability principles use water, electricity and other resources much more efficiently and effectively than conventional hotels and their activities in the local community are characterised by socially responsible business practices. The application of technology and information trends in the hotel industry is closely related to the satisfaction of hotel guests' needs, increase of attractiveness and competitiveness, given that, consequently, it realises a higher profitability and success in the increase in financial business performance.

Eric Lawson[28] studied the Effective ways of waste management in the hotel industry and its importance and discussed options for reduction in waste management, using refillable dispensers for soaps, shampoos and conditioners, using washable, cloth products and dishware, instead of disposable ones, using water filters, instead of plastic bottles, reducing, and using supplies, packaging materials, reducing the number of paper products, switching to LED lights. The four affective waste management methods, described by him or characterisation and quantification of waste in the hotel industry, understanding the waste, hierarchy, data analysis, model and framework, development for profitability from recyclable and compostable waste and sustainability and waste management. He believes it is mandatory for the hotel industry is to develop a complete framework which helps and optimising each waste material in the industry and also reduces the environmental impact.

[27] https://www.civilejournal.org/index.php/cej/article/view/2171

[28] Asia Pacific Journal of Multidisciplinary Research, Vol. 7, No. 4, November, 2019

5. RESEARCH GAP AND AIM OF THE STUDY

Many researches have been done considering the sustainability practices adopted by the luxury hotels abroad. Very few researches have been carried out with reference to Waste management practices adopted by the luxury hotels in India. The linkage of waste management to Sustainability goals of the hotel from employer perspective has also not been studied. The comparison of different waste management technologies and comparative sustainability study of technologies has also not been carried out. This study aims to investigate the Sustainable Waste management practices in Luxury hotels and Resorts by employing indicators of sustainable development, as aforesaid. India has large U.S. lodging brands today which have sustainability and or eco-friendly policies and web pages that are in public domain. These hotel chains are trying to implement the successes achieved elsewhere in sustainability practices in India too. This study shall evaluate the Sustainability practises implemented by the Hotels in India and evaluate its impact on their businesses and challenges faced therein. Through literature review, the gaps in the studies conducted earlier, have been identified as aforesaid.

5.1 Tabular listing of Literature review with Missing component of the Study

Author	Name of the paper and Findings	Missing component of the study
Afsanehsadat Omidani, Seyed Mohse HashemiHezaveh, College of Architecture, Bharati Vidyapeeth University, Pune, India (2016)	Review of Literature on Waste audit, WARM Model, Equivalency calculator and cost benefit analysis techniques on hotel properties and examining current status of Waste Management	This was a literature review. Methods of waste treatment was not covered. Study was carried out on secondary data.

Author	**Name of the paper and Findings**	**Missing component of the study**
Ishmael Mensah, University of Cape Coast	Waste Management practices of small hotels in Accra : An application of the waste management hierarchy model, study found that hotels did not strictly adhere to the WMH model and the hotels should employ sufficiency approach by influencing the attitudes of employees and guests toward waste prevention and reduction.	This covers Small Hotels and their limitations of Waste management.
Mrs. Esther Theresa Appaw-Agbola and Beatrice Freeman, Journal of Tourism, Hospitality and Sports, ISSN 2312-5187	Solid Waste Masnagement in Tourism Sector of Ghana. A Study of Selected hotels in Ho, the regional capital of Volta Region. The study revealed that food leftovers, vegetables, bones, bottles, cans and plastic bottles that cannot be burnt were deposited at landfill site.	Processing methods could not be discussed in detail in this paper due to demographic issues
Vikas Mohan, Bansal Deepak, Sharma Mona	Reduction and Management of Waste in Hotel Industries. This article compiled available information from literature on reduction and management of waste in hotel industries.	This is a Literature review on the

Author	**Name of the paper and Findings**	**Missing component of the study**
S.T. Pham Phu, M.G. Hoang, T. Fujiwara, Okayama University Global Journam of Environment Scient Management : 19-30, Winter 2018	Analyzing solid waste management practices for hotel industry. This research paper focused on tourism industry in HAC, Vietnam. It found that the SWG rate is 2.28 kg/guest/day. 84.3% of hotel waste was organic waste. Results suggested the waste recycling and composting potential of hotel's SWM should be analyzed in detail	This study is not based in India and has no technology evaluation of waste treatment.
Janeen Tang (2004)	A Case Study of Hotel Solid Waste Management Program in Bali, Indonesia. Tourism has direct impact on local communities through SWM	This paper is regarding a hotel Solid Waste Management Program and investigation of operational and management issues.
Yashwant Singh Rawal, Somya Takuli, Parul University (2021)	Waste Management : A review on Hotel Industry. This study shows the importance of alternative requirements for disposal of waste without affecting the environment and health of the people in surrounding area	Literature Review was done. Waste to Energy is discussed, but, cost factors, efficiency of technology, has not been taken into consideration

Author	**Name of the paper and Findings**	**Missing component of the study**
Sanaa Pirani, Hassan A. Arafat, Khalifa University (2014)	Solid Waste Management in Hospitality industry : A review Waste generation streams have been reviewed and suggestions offered	The authors have limited their scope of suggestions for preventing generation of waste. This will not help the industry as on date, as most of us are aware of prevention.
Shivangi Shrivastava, Dr. Sanjeev Kumar, Dr. Manoj Kumar (2019) Institute of Hotel and Tourism Management, Maharishi Dayanand University	Waste Management Practices in Indian Hotels. This study identifies chief waste sources and practices followd, through Literature review	No technology review is carried out, only secondary data is reviewed.
Murat Hocaoglu et. al.., 2010; Paulo et. al.., 2013	A qualitative and quantitative leap forward in water management corresponds to the recovery of water after treatment. Depending on the use of reclaimed water, special attention must be paid to water quality to avoid	Comparison of technologies has not been carried out in this paper. Cost evaluation is missing.

Author	Name of the paper and Findings	Missing component of the study
	risks to the environment and human health and to comply with current legislation on the reuse of reclaimed water. Stream segregation in greywater and blackwater can provide differentiated treatment options to enhance process efficiency (Murat Hocaoglu et. al.., 2010; Paulo et. al.., 2013). In addition, greywater contamination by faecal pathogens is avoided and blackwater streams are highly concentrated in organic load allowing for nutrient and energy recovery (Beler-Baykal, 2019).	
Borboudaki et. al.., 2005	Wastewater generated in touristic resorts must be treated before being discharged into the environment. However, the effluent quality may exceed the legislative limits when the influent flow exceeds the design capacity of the wastewater treatment facility. This situation is very typical in tourist areas where there is seasonal population growth	Methods of Meeting Compliance parameters have not been discussed in detail

Author	**Name of the paper and Findings**	**Missing component of the study**
Chen et. al.., 2013	Factors such as the scale and degree of complexity of treatment facilities, the climate of the area, the water management and water saving strategies and the nature of services provided govern the highly variable water demand per tourist	The Cost of treatment of water and effluent from the hotel has not been covered.
Tirado et. al.. (2019)	Estimated water consumption of 208–594 L·guest−1·night−1, for one-to five-star hotels in Mallorca,	The variation in load and its effects on treatment of waste water needs to be discussed further
Gutierrez-Escolar et. al.., 2014).	This high-water consumption far exceeded the average of 144 L·person−1·day−1 estimated for domestic activities	The consumption of an average individual with a tourist has been compared. When on tourism, the consumption of water footprint is higher than average, since the tourist may travel, swim, bathe etc.

Table 1 : Literature review

5.2 Gap Identification which can be covered in this research

Gaps Identified	Our Study
Most of the study conducted is on Literature Review and the type of waste generated by the Hotel Industry	We are going to study the Solid Waste Management as well as the Liquid Waste Management techniques employed by the Luxury Hotels
Study of Waste Management methods employed by the Hotels has not been done	We shall study the different technologies employed by the Luxury Hotels to manage their waste
Efficacy of the waste treatment method employed has not been studied yet	We shall compare the technologies employed for cost as well as efficacy

Table 2 : Gap identification from literature review

5.3 Summary of Cost heads of Waste Management in Hotels

Cost of Waste Management in hotels can be summarized as follows,as per our present understanding. As we dwell more into the research, more parameters may emerge.

Cost Head	Type of Treatment
Energy	OWC Machines for Wet Waste treatment, Pumps for Effluent treatment, Blowers for STP and ETP
Consumables	Cocopeat / Sawdust for OWC machines, Microbes for OWC machines, Chemicals for ETP and STP
Manpower	Operator for OWC Machine, ETP and STP, Segregation of Waste, Handling of Waste
Spent oil/ Lubricants, Batteries	Outsourced

Table 3 : Cost factors for waste management in a hotel

Water and Waste Water constitute a major part of the expenses in the hotels, because they pay for the water that they take form the Urban Local Body as well as they need to pay for the discharge of the water. Therefore, it is in the interest of the hotels that they recycle as much water as possible. In many cases, the water recycling efficiency is very poor because of the technologies applied for treatment, if the hotel is an old hotel. The basic compliance parameters are listed herewith for any hotel within India as specified by the CPCB norms.

Waste Water Characteristics	**Parameter**	**Value (Limiting value for concentration in mg/I except for pH) for Hotels with at least 20 bedrooms**	**Hotel with less than 20 bedrooms or a banquet hall with minimum floor area of 100 m2 or, a restaurant with minimum seating capacity of 36**
CPCB Guidelines	pH	5.5-9.0	5.5-9.0
In addition to the CPCB guidelines, the hotel should follow Coastal Regulations, for thise hotels that are situated near the shore	BOD (27o C)	30	100
	Total Suspended Solids	50	100
	Oil and Grease	10	10
	Phosphate	1.0	-

Table 4 : CPCB Parameters for Waste Water Discharge

6. RESEARCH OBJECTIVES

The luxury hotels claim that their operation system is conformed to sustainability principles with the aim of furthering their green agenda. In this study, we aim to investigate the validity and extent of this claim, while testing them on Sustainable Waste Management. The measurement instruments were compiled based on sustainability indicators that encompassed addressing social, economic, and environmental dimensions.

The research questions will be contextualized around four main themes: effective and sustainability planning, maximizing social and economic benefits for the local community, enhancing cultural heritage, and reducing negative environmental impacts. Many hotels adopt the agenda of going green is becoming a means toward branding, hotels are making efforts to implement a genuine sustainability practice. The research objectives formulated are as below:-

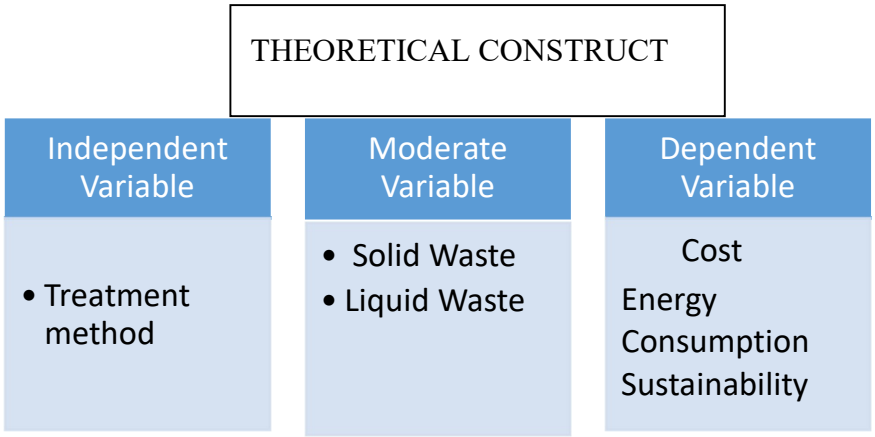
1. To Study the waste management techniques of hotel industries both liquid and solid.
2. To Study the treatment method of Solid Waste, whether the treatment is done using energy or it does not use energy for treating solid waste.
3. To Study the treatment method of Waste Water in hotel industry.
4. To study the compliance parameters achieved by the hotel industry.
5. To study the cost analysis of the techniques used by hotel industry for waste management.
6. To study the reporting of sustainable business practises by the hotel.
7. To Study the diversion rate of waste from landfill.
8. To study the recycling percentage of water by the hotel.

These research objectives will help in evaluating if the hotel is achieving the SDG 6(Clean Water and Sanitation) and SDG 15(Life on land) directly for the Hotel Industry, and whether it is aligning its actions towards meeting SDG 13(Climate action).

7. CONCEPTUAL FRAMEWORK

The above framework has been designed to assess the treatment Cost, Energy Consumption in treatment, and Sustainability of the treatment method for Solid Waste as well as Liquid Waste for the Hotel Industry. Solid Waste can be treated by different technologies. As a part of this study, we will compare Cost effectiveness, Energy Consumption and Sustainability of one method over the other.

Liquid Waste is categorized into laundry effluent and sewage. Our study will evaluate the technologies and methods adopted by the hotels to treat the laundry and the sewage waste and the efficiency of recycling of water in the sample population taken.



Therefore, our Independent variable is the Treatment method, Moderating variable is the type of Waste and the Dependent variable is the Cost of treatment, Energy Consumption and Sustainability of the method adopted. The Sustainability parameters of Waste management comprise of, but not limited to, Green House Gases emissions in treatment of waste which can be calculated using the electricity consumption for running machines, transportation needed (if any for waste management), diversion of waste from landfill by the hotel, percentage of reuse of water by the hotel, amount of fresh water that the hotel needs to purchase, reuse of compost prepared from wet waste within the hotel. The waste water parameters that will contribute to the sustainability of the hotel are, but not limited to, Effluent Stream and Sewage stream treatment methodology,

fluctuations of the load in the effluent and Sewage streams, compliance to outlet parameters of the Effluent and the Sewage streams, contamination of kitchen waste in Sewage treatment plant, chlorinated water from Swimming pools and laundry effluent treatment.

8. HYPOTHESIS

The Null Hypothesis considers that each situation of analysis is working at its best. If corrective actions are to be taken, the Alternate Hypothesis will need to be accepted. Therefore, for each dependent variable the Null Hypothesis and Alternate Hypothesis are mentioned below:

H_1 : Waste Management through energy consumption is more Sustainable for the Organization.

H_0: Waste Management through energy consumption is not Sustainable for the Organization

H_2 : Waste Management through energy consumption is more cost effective for the Organization.

H_{02}: Waste Management through energy consumption is not cost effective for the Organization

H_3 : Waste Management through Natural methods is more cost effective for the organization H_{03} : Waste Management through Natural methods is not cost effective for the organization

H_4 : Waste Management through Natural methods is more Sustainable for the organization

H_{04}: Waste Management through Natural methods is not Sustainable for the organization

H_4: Waste management through outsourcing is cost effective for the organization

H_{04}: Waste management through outsourcing is not cost effective for the organisation

H_5: Waste management through outsourcing is Sustainable for the organization

H_{05}: Waste management through outsourcing is not Sustainable for the organisation

9. RESEARCH METHODOLOGY

Coverage: - Sampling Study has been designed keeping all the objectives agenda and hypotheses in mind.

9.1. Universe of Study

Universe is the set of all experimental units, from which a sample is to be drawn. Population is the set of all values of the variables to be studied from those experimental units. Universe of this study are managers and the employees working with hotel industries and are being part of the organization for implementing policies and framing them.

9.2. Sampling Frame

Managers and employees including those working in the hotel industries at various levels. We intend to target both white collar and blue-collar workers in hotel industries and some feedback from the stakeholders in management levels too.

9.2.1. Sampling Procedure

For data collection we intend to use stratified sampling or convenience sampling which involves dividing the population into subpopulations that may differ in important ways. It allows one to draw more precise conclusions by ensuring that every subgroup is properly represented in the sample. To use this sampling method, the population is divided into subgroups (called strata) based on the relevant characteristics like gender, age range, income bracket and job role.

9.2.2. Units of observation and sample size

Sample Size considered is 100 luxury hotels and resorts across the gamut of hotels and resorts and if more are required can be taken into consideration and stakeholders available for qualitative inputs and justification. For the purpose of this study, every property is considered as a single hotel, even if it belongs to the same chain of hotels.

9.2.3. Data Collection

1. Study of Waste Management practises will be done though Cases as well as through Questionnaires.
2. Questionnaire will be distributed to managers and employees working in Luxury hotels and resorts.
3. The questionnaire will be pre-tested on employees of hotel industry. The purpose of the pre-test will be to remove ambiguities, and unnecessary items in the questionnaire. Pilot testing of the questionnaire helped to unearth the face and content validity and reliability of the questions in measuring what it was intended. The questionnaire then will be amended accordingly for use in the field. The refining of the items in the questionnaire can be done to make the items very simple for the respondents to understand so that they could provide the appropriate response to the items. The pre-test will give a fair idea of the responses to be obtained from the field.
4. Reliability and Validity of the questionnaire will be carried out. The researcher will make sure that the instrument developed will be reliable. This will be done by ensuring that the instrument clearly defined some concepts and constructs used to frame the items that highlight the concept or constructs used. More specifically, validity applies to both the design and the methods of the research. Validity in data collection means that the findings truly represent the phenomenon researchers are claiming to measure. Another is criterion validity means whether questions accurately predict the Validity gives the answer to does the measure accurately measure the concept it is supposed to and not something else. Face validity of the questionnaire will be tested by asking experts who understand the topic of sustainability.
5. As Likert scale will be used in the questionnaire for getting the answers both minimum and maximum values will be checked to avoid the errors in responses.
6. Number of questions shall be limited to approx 15 - 20 questions, including both open ended and closed ended questions.
7. Face to Face interview and Telephonic Interviews will be included.
8. Five point Liker scaling techniques will be included in the instrument.

9. The coding will be done using SPSS. The questionnaires will be properly coded in the software and proper statistical test will be applied.
10. We intend to take the directive and focused interview (both physical interview on field as well as telephonic)

9.3. Data and Tools

The study will use relevant statistical tools like ANOVA, Factor analysis, Correlation analysis, Regression analysis as will be found suitable for data analysis. Any other statistical tool is found suitable will also be employed in the study.

Sample Area: Luxury Hotels of Mumbai and around Mumbai, can constitute a sample population of the hotels in India.

Sample Unit: Luxury Hotels in Mumbai

$$SS = \frac{Z^2 * (p) * (1-p)}{c^2}$$

Where:

Z: Confidence level- 95%

C: Confidence level- 5%

Sample Size: 100 Hotels.

Sampling technique: Convenience Sampling / Random Sampling

Target Respondents: Employees working in the hotel industry and the management of Luxury hotels or resorts. Collection of data will be done by Questionnaire method (Likert Scale) and Open ended and closed ended questions in Interview method.

The study will cover suitable number of hotels as based on overall population size of luxury Hotels in Maharashtra. Such suitable number will be based on statistical analysis.

10. SCOPE & SIGNIFICANCE OF STUDY

There are less than 200 luxury hotels and resorts in Maharashtra in the Five Star category. The scope of this study shall be limited to only luxury hotels and resorts since these hotels use the more electricity as compared to smaller hotels, more water and generate more waste as compared to other smaller budget hotels. Also, the data management in these hotels is very strong because operate with a clear guideline for being sustainable, manage and document their resources efficiently, focus on customer satisfaction and compliances with the government norms. Also, Sustainability claims of these hotels are available in public domain. The budget hotels have been excluded from the scope of this study to maintain the sanctity of the data. Waste management of hotels will be studied and compliance status will be recorded. Each stream of Waste management till point of discharge will be studied. Suggestions to the hotels can be offered, if solicited. Our research will try to validate the correlation between the Sustainable Waste Management practices in Hotel Industry and co-relate it to the financial performance of the Hotel. The triple bottom line concept states that the smaller the impact a business has on the environment, the fewer the natural resources a business consumes, the longer and more successful the business will be. The scope of this research will be limited to the Luxury Hotels and resorts. The research will help to boost Economic Development, Environmental Economic, and Social Development of the firms which can re-establish their corporate strategy by introducing and implementing more integrated sustainable practices and also implement strategies of for enterprises such as lean and green practices. We will be able to evaluate the Sustainability of the population from the samples taken, as evaluated by us compared to the claims made the companies on sustainability in public domain. Our study will help the hotel industry identify the nest methods available for reuse, recycle, reduce and re-earth. A fair estimation of the quantum of waste which can be prevented from going into the Landfill may evolve at the end of the study. Our study will help in meeting the SDG 6(Clean Water and Sanitation) and SDG 15(Life on land) directly for the Hotel Industry, while working towards meeting SDG 13(Climate action).

11. TIME FRAME OF THE RESEARCH

Sr. No.	Activity	Time frame
1	Questionnaire Formulation	1 month
2	Actual Survey on field	6 months
3	Literature review	4 months
4	Analysis	5 months
5	Chapter writing	6 months
6	Review and Revisions	3 months

Table 5 : Timeframe

12. TENTATIVE SCHEME OF CHAPTERISATION:

1. INTRODUCTION
2. LITERATURE REVIEW
3. OBJECTIVES, SCOPE, RATIONAL STUDY AND SIGNIFICANCE OF THE STUDY
4. RESEARCH DESIGN / METHODOLOGY
5. HYPOTHESES OF THE STUDY
6. INTRODUCTION TO MUNICIPAL SOLID WASTE
7. INTRODUCTION TO WASTE WATER TREATMENT
8. ANALYSIS OF DIFFERENT TECHNOLOGIES FOR WASTE TREATMENT IN TERMS OF TECHNOLOGY AND SUSTAINABILITY

9. ANALYSIS OF DIFFERENT TECHNOLOGIES FOR WASTE TREATMENT IN TERMS OF TECHNOLOGY AND COST
10. IMPACT OF GOVERNMENT RULES AND REGULATIONS ON SUSTAINABILITY OF LUXURY HOTELS
11. DATA ANALYSIS and INTERPRETATION
12. FINDINGS AND SUGGESTIONS
13. REFRENCES

13. REFERENCE

1. https://www.sciencedirect.com/science/article/pii/S2212827114012189
2. https://www.hospitalitynet.org/explainer/4101989.html
3. https://www.emerald.com/insight/content/doi/10.1108/IJOPM-04-2015-0223/full/html?fullSc=1
4. https://www.researchgate.net/publication/333936000_Study_on_the_effects_of_sustainability_practices_on_the_growth_of_manufacturing_companies_in_urban_Ghana
5. https://www.investopedia.com/articles/investing/100515/three-pillars-corporate-sustainability.asp
6. https://www.mdpi.com/2071-1050/13/18/10051/htm
7. https://www.sciencedirect.com/science/article/pii/S0925527320303212?casa_token=Ii9jqUbb-xsAAAAA:cO18xEBHboL6FVt5V0Q6W4VZQaldlGZ0z_AYM-Oo4_PJOcfSa30bUMpIj0AjpLMoSP02BkDUSd7a
8. https://en.wikipedia.org/wiki/Sustainability
9. https://www.researchgate.net/publication/331800277_Hotel%27s_best_practices_as_a_strategic_driver_for_environmental_sustainability_and_green_marketing
10. https://www.researchgate.net/publication/330124909_Green_Marketing_Initiatives_and_Sustainable_Issues_in_Hotel_Industry_Concepts_Methodologies_Tools_and_Applications
11. https://www.google.com/url?sa=tandamp;rct=jandamp;q=andamp;esrc=sandamp;source=webandamp;cd=andamp;cad=rjaandamp;uact=8andamp;ved=2ahUKEwjJuuiZjqD4AhUaRmwGHV4gBRIQFnoECC4QAQandamp;url=https%3A%2F%2F
12. https://www.mdpi.com/2071-1050/11

13. https://d1wqtxts1xzle7.cloudfront.net/42036802/Green_marketing_programs_as_strategic_in20160204-32010-1qpen7p-with-cover-page
14. v2.pdf?Expires=1654773397andamp;Signature=Rvs08N9Jr90RJDGYh8AKXM2XZ7mSXFPEf~maiOeegzyRlDZ~UyYprC6qly26BKlU9HJ2RtZXhdWjUkJvRvzfZXEYRnCpJdZBnFRk23AgI1JtypdypXyCr8w89lU2cgmJt~T1CypVuiX3BACzEGLkQHgFxtRuxnxc~clAg8XVDj01J1Xk1xhWBRZJS3i2MdtmPYtkXXshlHXw8mrm~b0p8FRPi3B1JcblOJSXyz5cQS828qQQ7vGRNOe6aCvbp1jrhFaOSrpB2ODQJAwZsifu03DiLsSCeiP3C64m7r6DSV82r4IA1D~ufNj2QpuNpkdQBiiKHU6FQPKUAyqMw__andamp;Key-Pair-Id=APKAJLOHF5GGSLRBV4ZA
15. https://www.researchgate.net/profile/Roziah-Mohd-Rasdi/publication/271339172_Corporate_Social_Responsibility_Adoption_of_Green_Marketing_by_Hotel_Industry/links/5695b92408ae820ff074e244/Corporate-Social-Responsibility-Adoption-of-Green-Marketing-by-Hotel-Industry.pdf
16. https://scholar.archive.org/work/7hl237oyurevnk4zlcm7w7ctfa/access/wayback/https://www.civilejournal.org/index.php/cej/article/download/2171/pdf
17. https://www.sciencedirect.com/science/article/pii/S2212827114012189
18. https://www.emerald.com/insight/content/doi/10.1108/IJOPM-04-2015-0223/full/html?fullSc=1
19. https://www.researchgate.net/publication/333936000_Study_on_the_effects_of_sustainability_practices_on_the_growth_of_manufacturing_companies_in_urban_Ghana
20. https://www.investopedia.com/articles/investing/100515/three-pillars-corporate-sustainability.asp
21. https://www.mdpi.com/2071-1050/13/18/10051/html
22. Estimation of the Solid Waste Generation and Recycling Potential of the Hotel Sector: A Case Study in Hue City, Vietnam, Le Hoang Son[1,2], Yasuhiro Matsui[1*], Do Thi Thu Trang[3], Nguyen Phuc Thanh[4]
23. Waste Management in Hotel Industry in India : A Review, Afsanehsadat Omidiani, SeyedMohsen HashemiHezaveh, International Journal of Scientific Research and Publication, Vol 6, Issue 9, September 2016, ISSN 2550-3153
24. https://www.frontiersin.org/articles/10.3389/frsus.2022.837016/full
25. Analysis of hospitality waste generation: Impacts of services and mitigation strategies
26. Strategies to improve energy and carbon efficiency of luxury hotels in Iran

27. WASTE MANAGEMENT PRACTICES IN INDIAN HOTELS, Shivangi Shrivastava, 2Dr. Sanjeev Kumar, 3Dr. Manoj Kumar published in JETIR May 2019, Volume 6, Issue 5 www.jetir.org (ISSN-2349-51
28. Effective Ways of Waste Management in the Hotel Industry and Its Importance, Erich Lawson | March 29, 2018